

## **Critical Review: Tube Feeding in Advanced Dementia**

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The use of enteral feeding in individuals with advanced dementia has been a subject of much debate. In North America, it is estimated that one-third of nursing home residents with advanced cognitive impairment are tube fed. Despite the documentation of the burden of care associated with feeding tubes in this population, the number of feeding tubes placed in older individuals continues to increase, and many health care professionals, including speech-language pathologists, view enteral feeding as the standard of care for treating dysphagia in advanced dementia. Given the predicted increase in the prevalence of Alzheimer's disease in the next two decades, it is timely to examine the factors associated with tube feeding in patients with dementia. This evidence-based review examined original literature documenting the impact of tube feeding on pulmonary function and survival. Results of this review indicate that tube feeding is associated with aspiration pneumonia and fails to prolong survival in individuals with advanced dementia. In light of the evidence documenting a lack of benefit, future research is needed to identify other factors that may mediate the decision to use tube feeding in individuals with advanced dementia.

### ***Introduction***

According to the Canadian Study of Health and Aging Working Group (1994), 450,000 Canadians over 65 were diagnosed with Alzheimer's or a related disease in 2008. A common consequence of this disease is insufficient food intake and/or swallowing impairment. When individuals with advanced dementia are unable to recognize food, reject food, or have impaired swallowing, nutritional intake can be compromised. One medical approach used to ensure adequate nutritional intake is the implementation of enteral feeding. In North America, the number of feeding tubes placed in older individuals continues to increase, and it is estimated that one-third of nursing home residents with advanced cognitive impairment are tube fed (Mitchell et al., 2003). However, the ability to reduce aspiration and prolong survival using feeding tubes in individuals with dementia is controversial (Finucane, 1999; Gillick, 2000). For instance, tube feeding does not eliminate aspiration of oral secretions or gastric reflux which are both major causes of aspiration pneumonia (Guedon et al., 1996). In fact, it has been suggested that enteral feeding is a risk factor for aspiration and aspiration pneumonia (Garrow et al., 2007).

Despite the lack of clear evidence in using feeding tubes as an efficacious treatment, many health care professionals believe enteral feeding is the standard of care for treating dysphagia in advanced dementia (Vitale et al., 2006; Shega et al., 2003). In particular, more than 50% speech-language pathologists recommended tube feeding for patients with advanced dementia and dysphagia (Sharp and Shega, 2008). Families of patients with advanced dementia may place

high expectations on enteral feeding even when clinical improvements in physiologic function and survival are limited (Carey et al., 2006). Given the predicted increase in the prevalence of Alzheimer's disease in the next two decades, it is timely to examine the factors associated with tube feeding in patients with dementia.

### ***Objectives***

This evidence-based review will examine the literature documenting the impact of tube feeding on aspiration pneumonia and survival in individuals with advanced dementia.

### ***Methods***

#### ***Search Strategy***

Computerized databases, including CINAHL, PubMed, SCOPUS were searched from 1990 to 2008 using variations in several search terms. *Dementia* was individually combined with *aspirat\**, *survival*, *feed\**, and *enteral*. Citations from articles were also reviewed to obtain other relevant studies. The search was limited to articles written in English.

#### ***Selection Criteria***

Studies that investigated the impact of tube feeding on pulmonary function or survival in individuals with advanced dementia were reviewed. Other studies with subjects suffering from non-specific neurologic diseases were also included because individuals with advanced dementia might have been recruited.

#### ***Data Collection***

The literature search yielded five cohort studies and a single group pre-post test which met the criteria outlined above.

### **Results**

Peck et al. (1990) conducted a study to assess the application of long-term enteral feeding to patients with advanced dementia in a nursing home. Results of their study suggested that aspiration pneumonia occurred more often in individuals with tube feeding than those without tube feeding.

#### *Subject Selection*

The tube-fed group consisted of 52 patients who received a score of zero on the Mini-Mental Status Examination (MMSE), indicating that the entire group was at an advanced stage of dementia. Of these 52 patients, 39 received nasogastric tubes, 9 received gastrostomy tubes, and 4 had jejunostomy tubes. The non-tube-fed group consisted of an equal number of patients who were randomly selected from the same nursing home facility. Although the non-tube-fed group matched with the tube-fed group in terms of age, these individuals had a significantly shorter period of nursing home residence and fewer subjects were diagnosed with advanced cognitive impairment. Since the groups were non-homogenous, caution should be taken to avoid solely attributing the difference between the groups to tube feeding alone.

#### *Methodology*

Using the MMSE to define the level of cognitive impairment was appropriate as it is a commonly used screening tool for dementia. Overall, the study is reproducible with the procedures stated. However, aspiration pneumonia was not defined and the identification criteria were not provided. Since the study was retrospective and did not involve direct manipulation of subjects, careful statistical analyses were imperative for the correct interpretation of the data.

#### *Statistical Analysis*

The authors' use of non-parametric tests was considered appropriate for all data collected was categorical. For instance, chi-square test was used to compare the difference in number of episodes of aspiration pneumonia between the groups.

The data could have been more fully utilized if the authors also had examined the relationship between aspiration pneumonia and the various types of enteral feeding.

Despite the failure of providing a closely matched control group, the data revealed that tube-fed patients were three times more likely than non-tube-fed patients to experience aspiration pneumonia. The results of this retrospective cohort study were considered moderately strong.

Kadokia et al. (1992) evaluated the complications with aspiration following percutaneous endoscopic gastrostomy (PEG) or percutaneous endoscopic jejunostomy (PEJ) in 79 patients. Tube placement was successful in almost all patients, but aspiration occurred in 4% and 11.4% following PEG and PEJ, respectively. The authors concluded that aspiration was neither prevented nor reduced by these procedures.

#### *Subject Selection*

46 out of 79 subjects underwent PEG or PEJ because of neurologic disease. Since the researchers did not further categorize this group into specific etiologies, such as stroke, dementia, or other neurodegenerative diseases, the reader is unable to determine if these individuals presented with advanced dementia.

In this study, participants acted as their own control. This was an appropriate within group comparison because prior history of aspiration could be a critical confound for post-treatment aspiration.

#### *Methodology*

Similar to the study conducted by Peck et al. (1990), this paper failed to push the analysis further to examine the association between aspiration and the different diagnoses, even when the indications for tube feeding were already obtained.

#### *Statistical Analysis*

All findings were solely presented as descriptive data in the form of numbers and percentages. Since no statistical test was conducted, it was difficult to conclude if the findings reached statistical significance. As a result, it was impossible to objectively evaluate the suggested association that aspiration was not prevented by feeding tubes. A non-parametric test, such as a chi-square test, would provide a more valid analysis.

This study was a single group pre-post test which generally gives moderate level of evidence. However, the results could not be fully generalized to individuals with advanced dementia to meet our interest due to the absence of statistical analysis and the major limitation that the subjects were heterogeneous in nature.

Croghan et al. (1994) retrospectively reviewed 40 patients in a nursing home who had videofluoroscopic swallowing studies (VFSS) to determine if the presence

of aspiration on VFSS and the subsequent placement of feeding tube were associated with specific clinical outcomes, such as pneumonia and pneumonia as the suspected cause of death. They found that placement of feeding tubes in patients who aspirated on VFSS were associated with increase in pneumonia and pneumonia-related death.

#### *Subject Selection*

The study recruited all residents who underwent VFSS in a nursing home over a three-year period. Ten subjects had dementia, but the authors did not provide a specific definition of dementia or indicate the severity of dementia in these individuals. Since all subjects were derived from a range of medical conditions (e.g., stroke, cardiovascular, pulmonary, etc.), the sample appeared to represent the diverse nursing home population.

#### *Methodology*

According to the authors' definition, aspiration was passage of contrast material through the true vocal folds during VFSS. This measure might not be sensitive enough to capture all incidences of aspiration, such as aspiration of oral secretions or gastric reflux. In addition, aspiration severity was only rated by a single radiologist and intra-rater reliability was not reported. These factors affect the validity of aspiration severity as the independent variable.

Due to the retrospective nature of the study, it was impossible to determine if pneumonia was caused by aspiration and/or tube placement even though the existing results revealed an association. The authors postulated that the association might be due to the fact that all severe aspirators received tube feeding, whereas only few of the mild aspirators received enteral feeding. A prospective study would help identify the cause-and-effect relationship.

#### *Statistical Analysis*

Power analysis was performed and revealed that the scale of this study was too small to detect statistically differences that might in fact be clinically significant. As a result, Fisher's exact test was used to analyze the data (Moore and McCabe, 2003).

Despite the small sample size, this retrospective cohort study provided valuable information with respect to the efficacy of using feeding tube in a nursing home facility, in which many individuals with advanced dementia reside.

Mitchell et al. (1997) conducted a large scale, prospective study to determine the risk factors and impact on survival of feeding tubes in nursing home residents with advanced cognitive impairment. Results

of their finding showed that recurrent lung aspiration was the strongest risk factor for tube placement, and more importantly, there was no difference between survival in residents with and without feeding tubes.

#### *Subject Selection*

Individuals aged 65 or older were recruited from all nursing homes in the state of Washington using the Minimum Data Set, a federally mandated instrument used to identifying the needs and services for residents in long-term care. This approach allowed the researchers to obtain a large group of subjects from the elderly population.

The Cognitive Performance Scale (CPS) was used to define cognitive impairment. Subjects were included if they received a CPS score of five or lower at baseline and progressed to a score of six (coma stage) during a 24-month period. The authors excluded subjects who had feeding tubes *in situ* as well as those who were in comatose at baseline, for they believed the clinical reasoning for placing feeding tubes in these patients were significantly different from placing them in non-comatose patients.

#### *Methodology*

The paper provided very clear and detailed explanation of all variables used in the study. For example, survival time was measured from the day when a subject's CPS score declined to six to the date of death, or until the last assessment if the subject survived. Survival definition must be precise not only because it was the main outcome measure in this study, but also offers important information when survival is compared across studies.

Due to the prospective nature of this study, a range of independent variables (e.g., demographic information, medical diagnoses) were identified as possible risk factors *a priori*. As mentioned previously, this allowed for cause-and-effect analysis.

According to the authors, they were concerned about the heterogeneity of the tube-fed and non-tube-fed groups. For instance, if the tube-fed subjects were more medically fragile, they would have had a shorter survival than if enteral nutritional support was not initially provided.

#### *Statistical Analysis*

Chi-square and logistic regression were appropriately used to examine the risk factors associated with tube feeding. To compare between tube-fed and non-tube-fed participants, the Cox proportional hazards linear regression was employed so

the risk factors that were identified could be accounted for in the survival analysis.

This large scale, cohort study was carefully conducted to provide moderately strong evidence that survival of individuals with advanced cognitive impairment who received feeding tubes was not different from those without feeding tubes.

Meier et al. (2001) examined 99 patients with advanced dementia in a hospital setting to assess their survival during a period of feeding tube placement. Results suggested that the median survival of patients who received tube feeding (195 days) was not different from those who did not receive tube feeding (189 days).

#### *Subject Selection*

Patients with advanced cognitive impairment in a tertiary care hospital in New York City comprised the study population. Advanced dementia was defined by the Functional Assessment Staging Tool (FAST). Individuals with acute mental declines were excluded so that only subjects with stable neurological deficits were retained.

The authors indicated that the recruitment process might have been skewed, as the New York state law establishes high evidentiary standard for decisions to forego artificial nutrition, likely resulting in higher prevalence of tube feeding among patients who lacked decision-making ability. Furthermore, education background and socioeconomic status of the family members should have been noted because these factors might influence tube feeding decisions.

As with most retrospective studies, subjects were assigned to the treatment or control groups *post hoc*. As a result, the tube feeding group consisted of 68 patients who received artificial nutrition prior to or during hospital admission, and the remaining 31 patients formed the control group. Because of the small sample size, this study was unable to identify predictors that might associate with survival.

#### *Methodology*

In this study, survival was defined from the date of admission until discharge or death. Subjects were followed-up for two years until death was reported. Other variables (e.g., types of artificial nutrition), however, were not defined.

The researchers' attempt to minimize bias by blinding the experimenter was appreciated. The experimenter was unaware of the patients' medical and demographic characteristics with regard to their tube placement status.

#### *Statistical Analysis*

Similar to Mitchell et al. (1997), the authors used the chi-square test to examine factors that were associated with tube feeding and the Cox proportional hazards regression model to study the relationship between the independent variables and the time of death.

The authors' attempt to reduce experimenter bias through blinding, however, could not overcome the bias generated by collecting data from an urban hospital where prevalence of enteral feeding is high. With appropriate statistical analyses, this study provided suggestive evidence that tube feeding was not associated with survival.

Murphy and Lipman (2003) conducted a study to determine the relationship between gastric feeding and survival. Results indicated that PEG did not prolong the life of patients with dementia.

#### *Subject Selection*

All consultations for PEG tube placement in a medical centre were reviewed. Experimenter bias may have influenced the results as all participants were recruited and evaluated by the principal investigators.

The generalizability of the findings of this study was also questionable. Firstly, the sample was small (n=41) and comprised of only male, veteran participants. Secondly, advanced dementia was vaguely defined without any standardized measurements. Information regarding the participants' cognitive status was obtained from their medical records. This sample group might therefore include patients with a broad range of cognitive abilities, or might not necessarily include individuals with advanced dementia.

In the study, the authors postulated that the control group was analogous to the treatment group as both groups met the medical criteria for PEG tube placement. Under this assumption, the only difference between the groups was the presence of treatment since the surrogate decision makers of the control group refused the PEG procedure. However, this assumption may not have been valid as the investigators did not statistically compare the two groups for possible confounding factors, such as age, demographics, and other medical complications. As with the study conducted by Mitchell et al. (1997), if the treatment group were older and more medically fragile than the control group, they would likely have succumbed earlier if enteral nutrition was not provided.

#### *Methodology*

Survival was measured from the time of PEG placement to a maximum of two years. As mentioned previously, definition of survival is important to allow for comparison across different studies.

The PEG procedures applied were not clearly documented. The reader might wonder if these procedures were standardized across patients. Although “the best practice available in the literature” was employed, it was still unclear what medical procedure was performed. Variations do exist for placement of PEG tubes (Deitel et al., 1988).

According to the study, intra-abdominal abscess occurred in 4.3% of the subjects who received PEG. The authors claimed that the rate was comparable with other reports, but failed to re-analyze the data by excluding this factor, and thus may have led to an inaccurate estimation of survival in this group. It is possible that the researchers treated the complication as a common condition which is normally reflected in the real patient population.

#### *Statistical Analysis*

The Kaplan-Meier survival curve and the log rank test were used to compare the median survival between individuals with and without PEG placement. These tests were considered appropriate for survival analyses. However, power analysis was not conducted to determine the adequate sample size to minimize type II errors.

The paper described a retrospective cohort study which showed that median survival for PEG-fed patients (59 days) was not significantly different from those without PEG (60 days). Due to a number of methodological weaknesses, from subject recruitment to procedures, the evidence provided by this report is equivocal.

#### ***Conclusion***

Based on the studies reviewed, the literature provides moderate evidence that tube feeding is associated with aspiration pneumonia and fails to prolong survival in individuals with advanced dementia.

#### ***Clinical Implications***

In addition to the aforementioned impact on pulmonary function and survival, enteral feeding is associated with other complications. For example, tube feeding may result in incontinence and pressure ulcers because of physical restraints (Croghan et al., 1994). Artificial feeding also promotes bacterial colonization

because of reduced salivary production as well as negligence of oral hygiene (Langmore et al., 1998). From a social perspective, the placement of a feeding tube not only causes extreme discomfort to the individual (Li, 2002), but also signifies a loss of autonomy and dignity (Mitchell et al., 1997). Given the disadvantages of providing artificial nutrition, this intervention must be carried out with highly specific goals to ensure that its benefits outweigh its risks (Li, 2002).

Assisted oral feeding may be an alternative to enteral feeding. It is generally believed that hand-feeding allows the individual to enjoy the social component of eating, thus increase quality of life (Li, 2002). As well, caregivers can help reduce the risk of aspiration pneumonia by implementing aggressive oral hygiene in the individual with advanced dementia. For instance, the oral cavity of the individual can be routinely inspected during and after meals to minimize pocketing of food (Palmer and Metheny, 2008), whereas excess oral secretions can be suctioned to reduce aspiration of contaminated oral secretions (Langmore et al., 1998). It has been suggested that tube feeding is associated with significant oropharyngeal pathogenic colonization when compared with oral feeding in the elderly population (Leibovitz et al., 2003).

Despite the lack of evidence in using feeding tubes in individuals with advanced dementia, barriers exist in limiting the implementation of this procedure. Firstly, many health care professionals, including speech-language pathologists, mistakenly believe enteral feeding is the standard of care for treating swallowing disorders in advanced dementia (Sharp and Shega, 2008; Vitale et al., 2006; Shega et al., 2003). Educating physicians, nurses, speech-language pathologists, nutritionists, and other health care professionals by providing evidence regarding the risks of this intervention should help change the culture and practice of feeding tube placement (Shega et al., 2003). Educational programs were shown to be successful in reducing enteral feeding decisions in an acute care hospital (Monteleoni and Clark, 2004). Secondly, families of individuals with advanced dementia, with misunderstanding of the risks and benefits of artificial nutrition, often place high expectations on the procedure (Carey et al., 2006). Clinicians must therefore assist families in making fully informed decisions by communicating the specific goals, benefits and risks of using feeding tubes (Carey et al., 2006). More importantly, the patient’s and the family’s preferences should be considered prior to finalizing a clinical decision. Lastly, gastroenterologists, hospitals and nursing homes have high financial incentives that

favour feeding tube placement (Finucane et al., 2007). Without financial compensations, nursing homes are unlikely to devote more resources to hand-feed their patients (Li, 2002). In fact, residence in a nursing home is associated with an increased risk of feeding tube placement (Meier et al., 2001). Reimbursement schemes should therefore be modified to help discourage the use of enteral nutrition in treating dysphagia in individuals with advanced dementia.

To truly investigate whether tube feeding is an efficacious treatment for dysphagia in individuals with advanced dementia, conducting a prospective randomized control trial would be ideal. However, there are practical limitations in finding closely matched subjects as the control group (Vitale et al., 2006), obtaining informed consent from subjects with severe cognitive impairment (Baskin et al., 1998), ethical considerations in not providing intervention, as well as recruitment difficulties in finding an adequate sample size for complete randomization. Researchers will need to overcome these obstacles if they want to provide compelling evidence regarding the cause-and-effect relationship between tube feeding and aspiration and survival.

Future research can be focused in several areas. For example, researchers can examine the association of aspiration pneumonia and survival with different types of enteral support (e.g., nasogastric tube, PEG, etc.). Investigations can also be directed toward determining which groups of individual (e.g., mild vs. severe dementia) benefit most from artificial nutrition.

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